Appendix B
Overview of Integrated Waste Management

This appendix contains general information on integrated waste management. The topics included are: I. History of Waste Management; II. Waste Prevention; III. Recycling; IV. Landfill Issues; V. Incineration: Waste-to-Energy Facilities; and VI. Household Hazardous Wastes.

B–I HISTORY OF WASTE MANAGEMENT[1]

Early Waste Management

The first known law prohibiting the dumping of garbage in the streets of a major city was issued in approximately 500 B.C. in Athens, Greece. The leaders of that advanced civilization also created the first municipal disposal sites when they required scavengers to dump their trash not less than a mile from Athens. Unfortunately, the Greeks' advanced practices in waste removal were not adopted in medieval Europe. In fact the people of Paris were throwing their wastes out of windows until sometime in the fourteenth century. Several hundred years later, as large numbers of people from rural areas sought jobs in factories in newly industrialized cities, some of the earlier waste disposal practices were renewed. As a result of the careless disposal of waste, the problems created by the garbage multiplied, and city governments were forced to take appropriate actions. Thus, the collection and disposal of garbage became a municipal responsibility.

As the cities began transporting their garbage to the countryside, scattered piles of refuse became common sights on the outskirts of such towns. The cities expanded and, thus, the open surrounding lands became smaller, the problems created at the dumps became intolerable, especially the terrible odors and the infestation of rats. It was at this point that pits were dug to restrict the dumping to certain areas. However, as the populations in Europe increased, the pits not only were taking up too much space but also were creating other problems, including the contamination of groundwater. A new solution to the disposal of garbage had to be found.

One of the first alternatives to the garbage pits was the incinerator, and the first one was tested in Nottingham, England, in 1874. Depending on what is being burned, incineration reduces the volume of waste by 70 to 90 percent, so those with responsibility for getting rid of garbage in the late 1800s heralded the new development. Those municipalities that could afford the outlay of funds soon built incinerators to handle their waste products, but the less affluent cities could not afford to adopt the new approach. In a short period of time, new problems came with the use of incinerators, namely a deterioration of air quality. Thus, many of the cities that had built incinerators to take care of their garbage abandoned the approach. The burial of waste continued to be the most widely used method to waste disposal in the early 1900s.

Although the states in the United States could intervene if there were risks to public health and safety, the primary responsibility for problems created by the improper disposal of solid waste rested with the federal government in the first half of the twentieth century. Some of the principal actions taken at the federal level to avert threats to human health were the Rivers and Harbors Act of 1899, which forbid the dumping of wastes on the banks of or within "navigable" waterways; a 1933 Supreme Court ruling that made it illegal to dump municipal waste in the ocean; and the 1948 Water Pollution Control Act, which promoted research into the causes and solutions of water pollution and directed the first enforcement procedures for reducing the pollution of interstate waters.

The principal concerns regarding waste disposal in California during the first half of the twentieth century were ones related to public health and public nuisance. In many areas around the state, the open burning of garbage was practiced during this period, and wastes of all types were being dumped into the rivers. In 1949 the legislators in Sacramento created the State Water Pollution Control Board, which was the predecessor

[1]The material in this section was adapted from *Closing the Loop: Integrated Waste Management Activities for School and Home, K-12.* Sacramento: California Integrated Waste Management Board, 1993, p. D-21.

to the State Water Resources Control Board. The focus of the Board at this time was on the pollution of the state's waterways caused by industrial and municipal sources; however, violations were usually handled administratively, because water problems associated with landfills were not yet considered significant.

Waste Management in the 1950s and 1960s

New products and new types of packaging in the 1950s resulted in an astonishing increase in the amount of waste generated in the United States during this period. Mixed materials in packaging, which makes recycling particularly difficult, became very common. An increase in the volume of packaging at this time led to the abandonment of open trash collection trucks, which had facilitated the recycling of garbage, and a shift to garbage compaction trucks. However, the increased volume of waste was so great that the shift to compaction trucks could not accommodate the new levels of waste that were being generated. Therefore, the cities began opening garbage transfer stations, where the garbage from compaction trucks was re-compacted for shipment to landfills. Along with the evolution in packaging came increased costs for handing waste, which resulted in an increased cost for dumping that also reduced the opportunities for recycling anything useful from the compacted trash.

In 1967 the California Department of Public Health, using funds from the federal Solid Waste Disposal Act of 1965, conducted a study of solid waste disposal methods in the state. Results of this study revealed significant environmental and public health and safety problems resulting from landfilling, including safety hazards, air and water pollution, vectors, and unsightly operations. At this time approximately 75 percent of all disposal sites were open-burning dumps. In addition very little regulation of these facilities was taking place.

Waste Management in the 1970s and 1980s

As a result of the study initiated by the California Department of Public Health, Senate Bill 5 was passed in 1972 by the California Legislature. This legislation created the Solid Waste Management Board (SWMB). The SWMB was mandated to develop a state policy, including minimum standards for disposal facilities and for resource recovery. In addition counties, in cooperation with cities, were required to develop comprehensive solid waste management plans that were to be reviewed and approved by the SWMB. Senate Bill 1797, passed in 1974, required that before a new solid waste management facility could be established, it had to be found in conformance with the local County Solid Waste Management Plan.

In response to increasing concerns about solid waste disposal, the federal government passed the Resource Conservation and Recovery Act of 1976 (RCRA). Subtitle D of this act imposed requirements and restrictions on disposal of solid wastes. The first criterion was to perform an open dump inventory to ensure that facilities met federal standards. Second, those facilities that did not meet the standards were put on a list, and operators were to bring the facilities up to certain standards within five years. The inventory for the state of California was conducted by the SWMB. From 1979 to 1983 the SWMB staff inspected approximately 90 to 95 percent of the existing landfills and the majority of the closed facilities.

A 1984 amendment to the federal RCRA required states to develop programs for bringing the existing landfills into compliance with existing federal criteria within 36 months, and in compliance with new, revised criteria within 18 months after adoption by the U.S. Environmental Protection Agency (EPA). In addition new studies were commissioned to evaluate the adequacy of existing groundwater contamination standards and to study problems associated with emissions of dioxins at waste-to-energy facilities.

In California the design and operation of solid waste facilities were being improved in various ways, including the elimination of open dumps and the remediation of unsafe and unsanitary operating conditions. More comprehensive standards for facilities were developed, and assistance was provided to local government for planning and siting of new facilities. Approximately 450 landfills, 240 transfer stations, 3 composting facilities, and 5 waste-to-energy facilities were issued facilities permits by the local agencies.

In 1986 the California Beverage Container Recycling and Litter Reduction Act (Assembly Bill 2020) was passed to encourage recycling of aluminum, glass, plastic, and bimetal beverage containers.

In 1987, the Solid Waste Disposal and Site Hazard Reduction Act (AB 2448, Eastin) created a fee-based account to support closed, illegal, and abandoned site cleanup. It required development of disposal site closure and long-term maintenance plans with financial assurances for their implementation.

The California Integrated Waste Management Act[2]

In 1989 legislation was passed that marked a dramatic shift in solid waste management principles and practices in California. Assembly Bill (AB) 939, the California Integrated Waste Management Act, was the foundation of this new approach. This legislation renamed the SWMB so that it became the California Integrated Waste Management Board (CIWMB). It also established a new waste management hierarchy, starting with source reduction as the first priority (now referred to as "waste prevention"); recycling and composting as the second priority; and environmentally safe landfilling and transformation as the last options.

The Integrated Waste Management Act required that cities and counties divert 25 percent of all waste from landfills and transformation facilities by the year 1995, and 50 percent by the year 2000. Cities and counties are also required to reduce their solid waste, not just manage it.

The focus of this legislation was to shift away from reliance on landfill disposal of waste and turn toward a policy of preventing waste generation in the first place, reusing products and reducing packaging as much as possible, then recycling and composting whenever possible. This approach preserves natural resources and saves energy; it also reduces the generation of air and water pollution both in manufacturing and disposal practices.

Waste Management-Related Legislation

Since the passage of AB 939, additional legislation was passed that broadens the scope of California's integrated waste management programs and responsibilities. Some highlights of the legislation include the following:

Assembly Bill 4 (Eastin), Passed in 1989
Required increased procurement of recycled products by state and local agencies.

Assembly Bill 1305 (Killea), Passed in 1989
Established a phased-in mandate for recycled content for commercial consumers of newsprint, culminating in 50 percent postconsumer recycled content by the year 2000.

Assembly Bill 1308 (Killea), Passed in 1989
Provided bank and corporation tax credit of 40 percent for the cost of equipment used to manufacture finished recycled products.

Assembly Bill 1843 (W.Brown), Passed in 1989
Established a major regulatory program to control the disposal of used tires.

Assembly Bill 1381 (Areias), Passed in 1991
Required the CIWMB to develop and implement a waste prevention and recycling program for school districts.

Senate Bill 235 (Hart), Passed in 1991
Provided specific regulations for the manufacture and sale of rigid plastic containers. By January 1, 1995, all plastic containers were to meet one of the following criteria: be either source reduced by 10 percent, contain 25 percent postconsumer resin, be reusable or refillable, or meet specified recycling rates.

Assembly Bill 2076 (Sher), Passed in 1991
Authorized the development of a used-oil recycling program within the CIWMB to promote and develop alternatives to the illegal disposal of used oil. This bill also included grants, public information, and certified collection centers.

Assembly Bill 1220 (Eastin), Passed in 1993
Increased funding levels for cleanup of abandoned and illegal solid waste disposal sites, increased funding for market development and public education, provided funds for household hazardous waste, and consolidated "tipping fees" for waste disposal.

Assembly Bill 1851 (Sher), Passed in 1995
Required specific levels of recycled plastic postconsumer material in the manufacture of plastic bags for sale in California.

Senate Bill 1330 (Lockyer), Passed in 1997
Required the CIWMB to create a program of grants to cities and counties to cover the costs of cleaning up solid waste that had been disposed of illegally on farm or ranch property.

Assembly Bill 117 (Escutia), Passed in 1998
Extended the fees for the California Tire Recycling Act to fund the continued cleanup of tire disposal sites because of the danger they pose to public health and safety and to the environment.

[2]Adapted from "Overview of Waste Management Law in California Since 1989," Sacramento: California Integrated Waste Management Board, draft document, January, 1999.

Assembly Bill 228 (Migden), Passed in 1998
Among other provisions, added abandonment of tires to the circumstances under which a person could be convicted of a crime.

Senate Bill 876 (Escutia), Passed in 2000
Raised and extended the tire fee to $1.00 per tire until December 31, 2006, thereafter reducing to $0.75. The retail seller pays the fee for each new tire purchased from a tire wholesaler. The bill also creates a tire hauler manifest system, strengthens enforcement, and provides for increased tire site cleanup.

Waste Management Timeline

The following timeline summarizes the history of waste management, noting specific events through the years:

300 million years ago: Wasps were making paper.

2.5 million years ago: First tools were made by man.

8000 B.C.: The old Stone Age ended, animals were domesticated.

Between 8000 and 7000 B.C.: Ground and polished stone axes were made.

Around 4000 B.C.: Meteoric iron was probably used.

4000 B.C.: Written history began.

Around/After 4000 B.C.: Copper was first smelted.

Between 4000 and 3000 B.C.: Bronze was first smelted; Bronze Age began.

3000 B.C.: Meteoric iron was used in Egyptian pyramids.

Between 2000 and 1000 B.C.: Iron was first smelted, Iron Age began, and glass blowing began in the Near East.

Around 1000 B.C.: Iron became abundant in Europe and the Near East.

500 B.C.: Athens, Greece, issued first known edict against throwing garbage into the streets; ordered waste to be dumped no less than one mile beyond city limits.

105 A.D.: Paper was first made in China.

1035: Paper-wrapped vegetables appeared in Europe.

1388: English Parliament banned the dumping of garbage in public waterways.

1400: Garbage accumulated outside Paris' gates and interfered with the city's defenses.

1620: First iron foundry was built in America.

1690: First paper was produced commercially in Philadelphia.

1739: First successful American glass foundry was operating in Salem, N.J.

1790: Paper was first made completely from wood in Vermont.

1801: Fourdrinier machine that produced continuous roll of paper was patented.

1810: First tin-plated iron can was patented as a food container in England.

1818: Tin-plated can was introduced in America.

1825: Aluminum was first isolated from ore.

1842: Research in England linked unsanitary conditions to disease.

1844: Vulcanization process was discovered by Charles Goodyear in the production of rubber tires.

1849: Pendulum press was patented, making possible production increases from 5 to 6 cans per hour to 50 to 60 cans.

1859: First important discovery of oil was made by Edwin Drake (lighting fluid).

1860: Citizens of Washington, D.C., continued to dump waste in city streets.

1869: Lithography label printing process for cans was developed.

1874: First systematic incineration of municipal refuse was tested in Nottingham, England, using "The Destructor."

1880-1890: Automatic can-making machinery was created.

1885: U.S. built its first garbage incinerator on Governor's Island in New York.

1886: Waste reduction plants, which compress organic waste to extract grease, oil, and other by-products, were piloted in the U.S.; the plants later closed because of noxious emissions. Charles Martin Hall isolated aluminum through electrolysis.

1888: First commercial production of primary aluminum occurred.

1898: First trash-sorting operation for recycling was introduced by the street commissioner in New York City.

1899: Rivers and Harbors Act made the disposal of debris on the banks of and into navigable waterways illegal.

1902: A Massachusetts Institute of Technology report revealed that 79 percent of U.S. cities provided regular collection of garbage.

1904: First aluminum recycling business was founded.

1908: Oil was discovered in the Middle East.

1913: Aluminum foil was first produced.

1914: Approximately 300 incinerators were operated in the U.S. and Canada.

1915: Activated-sludge sewage treatment process was developed.

1916: The U.S. produced 15,000 tons of paper a day, using 5,000 tons of used paper and resulting in a 33 percent recycling rate. First landfills were established.

1920: Reclaiming wetlands near cities with layers of trash and dirt became a popular disposal method.

1931: Neoprene rubber and fiberglass were invented.

1933: U.S. Supreme Court outlawed ocean dumping of municipal waste.

1938: Fluorescent lamps were marketed; polystyrene was invented.

1939: Dichlorodiphenyltrichloroethane (DDT) was found to be an insecticide.

1940: Nylon stockings were widely sold. Nontoxic pigments replaced lead in interior paints.

1941: Aerosol spray cans were introduced with chlorofluorocarbons (CFCs).

1942: Americans collected rubber, paper, scrap metal, and tin cans to help the war effort.

1943: Polyethylene plastic was invented.

1944: Silicone resins were marketed.

1947: Instant photos were introduced.

1948: The Federal Water Pollution Control Act authorized limited enforcement in interstate waters and established principles for a state-federal cooperative program.

1949: The State Water Pollution Control Act created the State Water Pollution Control Board and protected California waters from pollution by industrial and municipal wastes.

1953: Vermont passed the first container law in the nation; Detroit's first all-fiberglass car body and first U.S.-made polyester were developed.

1956: The Federal Water Pollution Control Act required states to establish ambient standards for water quality and to develop a program for enforcing them.

1957: Vermont's first container law was allowed to expire; first U.S. commercial nuclear power plant opened; aluminum was first used in metal can manufacturing.

1959: The American Society for Civil Engineers established a guide for sanitary landfilling, requiring the refuse to be compacted and covered with a layer of soil daily.

1960: The Organization of Petroleum Export Countries (OPEC) was formed; easy-opening cans were introduced.

1963: The Federal Clean Air Act provided federal government enforcement authority to control interstate air pollution.

1964: Consumers switched to biodegradable detergents.

1965: The Federal Air Quality Act provided air quality criteria and guidance on the best methods for preventing or controlling air quality problems; the Federal Solid Waste Disposal Act provided substantial grants to local governments for studying solid waste problems and prescribing solutions; tin-free steel cans were developed.

1967: The California Department of Public Health studied the condition of solid waste in California, utilizing federal Solid Waste Disposal Act monies; the California Mulford-Carrell Air Resources Act created the California Air Resources Board.

1968: More than one third of U.S. cities were practicing some form of materials separation for recycling.

1969: The National Environmental Policy Act required all federal agencies to take environmental factors into account when making policy.

1970: The First Earth Day was held (April 22); U.S. Environmental Protection Agency (EPA) was established; amendments to the Clean Air Act required states to prepare implementation plans for controlling air pollution; the California Porter-Cologne Water Quality Control Act established water quality control plans and waste discharge permits; Legislation was passed in California to eliminate open burning; the California Environmental Quality Act required preparation of an Environmental Impact Report on any facility significantly affecting the environment; this was the peak year of U.S. oil production; the Federal Clean Air Act was created.

1972: Federal Water Pollution Control Act required U.S. EPA to establish national effluent

standards for all point sources of water pollution.

1973: Senate Bill (SB) 5 was passed, creating the California Solid Waste Management Board; DDT is banned in the U.S.

1974: Oil embargo/Egyptian-Israeli War—U.S. experienced first oil price shock; the federal Clean Water Act was created.

1976: The Federal Resource Conservation and Recovery Act, Subtitle D, required U.S. EPA to set criteria for sanitary landfills.

1978: CFCs were banned as aerosol propellants.

1979: U.S. EPA closes its waste reduction branch and concentrated its efforts on managing hazardous waste; second oil price shock occurred; every state had some form of disposal regulation, but regulations varied greatly in content.

1986: California's Beverage Container Recycling law was passed; Rhode Island enacted the nation's first mandatory recycling law.

1988: U.S. EPA estimated that at least 14,000 landfills had closed in the last ten years; more than 70 percent of the facilities were operating at the time.

1989: Assembly Bill (AB) 939 established the Integrated Waste Management Act, revolutionizing California's approach to waste management; twenty-six states had enacted some form of comprehensive mandatory recycling law; the first polystyrene recycling plants were opened.

1990: Manufacturers in the U.S. were required to stop using CFCs, which deplete the Earth's ozone layer. As part of Resources Recovery Act, Subtitle D, U.S. EPA released new regulations for sanitary landfills.

1991: The California Oil Recycling Enhancement Act of 1991 established state certified oil collection centers.

1994: Californians recycled an estimated 202,000 tons of steel cans.

1995: California met the 25 percent diversion goal, as mandated by AB 939.

1997: California adopted a Resource Efficiency Program to help businesses do more with less.

1998: Californians threw away an average of two pounds of trash per person per day—a great improvement over the three pounds per day estimated in 1990.

2000: California cities and counties must meet the 50 percent diversion goal, as mandated by AB 939 (pending determination in 2001).

B–11 WASTE PREVENTION[3,4]

When asked what they can do to reduce their waste, most people answer, "I can recycle!" Recycling has become popular among local governments, businesses, and citizens as a method to divert valuable materials from landfills. However, recycling uses energy and other natural resources and does not reduce the amount of waste actually generated.

Preventing waste from being created in the first place, "waste prevention," is the best way to reduce waste. After all, waste that is never created does not have to be managed. Furthermore, waste prevention conserves resources, reduces costs, reduces pollution, and encourages innovation. For these reasons, waste prevention is the highest priority in California's integrated waste management hierarchy.

Everyone can play an important role in preventing waste. Whether at home, work, or elsewhere, waste prevention is something we can all practice. Ideally, individuals, organizations, and businesses should evaluate the opportunity to eliminate waste wherever possible in the products or packaging that are bought, used, or sold.

How Can People Prevent Waste While Shopping?

The first thing shoppers should consider before they buy is whether they really need the item. They should also consider whether there is a less wasteful alternative to the item that is being purchased. For example, reusable products create less waste than do products designed for one-time use.

Since packaging is one of the leading sources of waste in landfills, shoppers should choose products with the least packaging. Shoppers should also consider large or economy size containers for household products that are

[3]Adapted from "Overview of Waste Prevention Techniques," Sacramento: California Integrated Waste Management Board, 1998.

[4]Adapted from "Schools: Laboratories of Waste Prevention," Sacramento: California Integrated Waste Management Board, 1998.

used frequently, such as laundry soap or pet foods. As the amount of a product in a container increases, the packaging waste per serving or use usually decreases. Using concentrated products also reduces waste, as does bulk merchandise. Using reusable shopping bags reduces the waste of both paper and plastic bags. Supporting store managers when they stock products with reduced or no packaging will encourage them to continue doing so.

While waste prevention means reducing the amount of materials going into the waste stream, another critical component is reducing waste toxicity. Whenever possible, consumers should look for the least toxic alternative of a given product.

How Can People Prevent Waste At Home?

Householders should always think twice before throwing something away: Can the item be reused for another purpose? Bags, containers, boxes, and envelopes can often live many lives. After washing, for example, empty glass and plastic jars, milk jugs, coffee cans, or dairy tubs can be used to store leftovers as well as buttons, nails, or thumbtacks.

Note: Never reuse containers that contained motor oil, pesticide, or other toxic products; harmful residues can persist. Never store anything potentially harmful in containers designed for food or beverages. When storing potentially harmful products, label the containers and store them out of the reach of children and pets.

If an item is no longer useful to one person, it can be donated to friends and relatives or charitable organizations, or even sold at a garage sale. Items that are used infrequently—such as party decorations, audiovisual equipment, chain saws, rug cleaners, and garden tillers—can be rented, borrowed, or shared.

What About Preventing Waste at School?

One of the most effective ways to reduce the mounds of trash generated in California every day is to educate students about the value of waste prevention. Not only do such efforts help local governments meet waste diversion goals, but also educational programs in our schools represent the best opportunity to make lasting changes in individual habits and our "throw away" culture. Educating the next generation of adults about simple waste prevention will make the job of reducing garbage in the waste stream far easier in the future.

One of the most preventable sources of waste at schools is the paper produced in the classroom. The large volume of paper used by the more than 6 million public schoolchildren in California can significantly contribute to the waste stream. Simple practices of waste prevention, however, can bring these volumes down considerably. For example, teachers can encourage students to submit homework on the back side of used paper, can print handouts on both sides, and can maximize the use of overhead projectors and the chalkboards to minimize the use of photocopied information, thus reducing both waste and the cost of materials.

What About Packaging?

Packaging serves many useful purposes. "Good" packaging protects its contents from physical damage and spoilage and may also ensure that the contents are sanitary. Good packaging reduces the volume of solid waste by reducing spoilage and damage. Labels on packaging identify contents and provide directions for use. Packaging may also help retailers advertise their goods, keep sales records straight, and discourage theft.

The problem with packaging is that it substantially contributes to the volume of solid waste needing disposal, depletes limited resources, adds to litter and pollution, and increases the cost of a product. Almost all packaging is meant for disposal after one use.

Some packaging materials contribute nonbiodegradable or toxic materials to the environment. Harmful packaging is packaging that through its manufacture or use hurts the health of humans, plants, or the environment. In the U.S. such packaging rarely remains in use once there is a scientific consensus that it is harmful, and then government action is usually taken. However, it often takes decades for such a consensus to develop; it took at least two decades for consensus to be achieved on the harmful effects of chloroflourocarbons (CFCs) used in polystyrene.

Consumer pressure can influence manufacturers to reduce excess packaging. Excessive packaging is generally any packaging that does not protect contents from damage or

spoilage. If consumers avoid purchasing goods with excess packaging and voice their concerns to manufacturers, manufacturers will take notice.

Does Waste Prevention Hurt the Economy?

The goal of waste prevention is not to discourage economic activity or job creation. It is aimed at encouraging production processes and consumer choices that are efficient and that conserve resources.

Waste prevention often encourages innovation and creativity. For instance, many businesses have found that improved products or packaging ideas can emerge after identifying ways of reducing waste and using resources more efficiently. In this way waste prevention can help California businesses compete effectively in national and international markets.

To help the business communities reduce waste, the California Integrated Waste Management Board adopted its Resource Efficiency Program in 1997.[5] The program helps businesses do more with less, thus meeting the profit interests of the private sector while reducing waste. This program provides informational materials and assistance to local governments and businesses on business resource efficiency and waste reduction techniques.

What Are Some Sources for Free or Low-Cost Reusable Items?

Dime Stores: Boxes, leftover or damaged packs of crayons, leftover toys, school supplies, etc.

Drugstores: Small plastic bottles, crayons, and other school supplies.

Electric Power Companies: Wire, large spools, and assorted packing materials.

Furniture Stores and Factories: Large packing boxes, packing material, fabric scraps and swatches, and scrap lumber.

Garment Factories and Clothing Firms: Buttons, decorative tape, ribbon, yarn trim, spools, fasteners, fabric scraps, etc.

Gift Shops and Boutiques: Candles, packing boxes, polystyrene packing material, wrapping paper, ribbon, etc.

Grocery Stores, Food Co-ops, and Outdoor Markets: Cartons, packing materials, fruit crates, large cardboard and materials from displays, discarded display racks, polystyrene fruit trays, and baskets of any sort.

Hardware Stores: Sample hardware books, sample tile charts, linoleum samples, rope, chain, wood, molding strips, etc.

Ice Cream Stores: 3- or 5-gallon ice cream containers.

Interior Designers: Fabric, carpet and flooring samples and scraps.

Leather Craft Companies: Scrap pieces of leather and lacing.

Lumber Companies: Scrap wood, damaged bricks, concrete blocks, doweling, wood curls, etc.

Offices of Any Sort: Discontinued business forms and posters (blank on one side), pencils and erasers, office furniture, file cabinets, lamps, typewriters, envelopes, manila folders, large envelopes, etc.

Paint Stores: Any leftover paint, samples, sample books, wallpaper books, end rolls of wallpaper, tiles, linoleum, etc.

Paper and Printing Companies: Endcuts, damaged paper, and posters.

Phone Companies: Colored wires, old telephones, and large spools.

Photographers and Framing Shops. Empty film containers, scraps from matboard, and foam core.

Plastics Companies: Trimmings, cuttings, tubing, scrap plastic, and plexiglass.

Plumbers and Plumbing Supply Companies: Wires, pipes, tile scraps, linoleum.

Printmakers and Artists: Paper and matboard scraps.

Quiltmakers and Rugmakers: Scraps of fabric and batting.

Repair Shops: Unclaimed appliances like televisions, clocks, fans, lamps, record players, typewriters, sewing machines, radios, etc.

Restaurants: Old candles, mushroom baskets and other empty food and produce containers, corks, ice cream containers, bottle caps, boxes, and cartons.

Rug Companies: Any leftovers or scraps, sample swatches, and end pieces from carpets.

[5]From information about the Resource Efficiency Program, provided by California Integrated Waste Management Board staff member Kathy Frevert in December, 1998.

Textile Companies: Color samples and scraps of fabric.

Tile and Ceramic Companies: Leftover or damaged tile, etc.

Toy Stores: Leftovers, damaged products, packing materials, and boxes.

Upholsterers and Tailors: Buttons, scrap material, spools, cord, string, etc.

For More Information

A Districtwide Approach to Recycling: A Guide for School Districts, by California Integrated Waste Management Board (Publication # 500-94-009) includes case studies documenting the economic benefits of districtwide programs and provides detailed information on how to promote district-wide recycling.

Seeing Green Through Waste Prevention, also by the California Integrated Waste Management Board (Publication #500-94-101), provides valuable insights into how to perform waste composition surveys, waste prevention activities, and cost analysis procedures to help set up a comprehensive waste reduction program.

B–III RECYCLING[6]

An important first step, before recycling, is to prevent waste in the first place. To prevent waste, we need to first purchase only what we need, then try to reuse items as many times as we can before recycling them. We should try to throw out as little as possible.

Recycling Preconsumer Materials

Recycling internally generated materials has long been a practice of manufacturing industries. What can be recycled within the manufacturing process saves money and generates more profit. Small savings repeated over and over do add up to substantial savings for the producer. Most scrap metal, plastic, paper, and glass generated during the production of consumer goods are recycled in the manufacturing process.

Recycling Postconsumer Materials

Even if we reduce our consumption of materials and reuse them as much as we can, we will still have to discard some of these materials. These materials are known as postconsumer materials. Recycling postconsumer materials gives a second life to materials that have been used by consumers and have reached the end of their productive life. Recycling is an important step that consumers can take to reduce waste.

Recycling is not an environmental panacea, however. Since it is just another form of manufacturing, recycling contributes its own share of waste and pollution problems. For example, recycled papermaking requires energy, is water-intensive, and produces considerable amounts of pulp-sludge that must be disposed.

De-inking paper for recycling concentrates potentially toxic ink substances in its waste. Aluminum recycling requires much less energy, but produces a similar amount of air pollution when it is smelted. In spite of the pollution it creates, recycling causes much less environmental damage than manufacturing from virgin materials. Recycling saves energy and natural resources, reduces pollution, and saves valuable space in landfills.

How Much Can We Really Recycle?

Theoretically, the vast majority of the materials we consume could be recycled. However, the challenge is not so much in recycling the materials, but in *recovering* them. Several myths about recycling have limited recovery rates: "People won't separate their trash." "Recycling cannot make a serious dent in the waste stream." "Recycling costs too much." However, as the cost of waste disposal increases and pressure intensifies to divert materials from landfills, more and more people are recycling at least some of their waste. The increased levels of recycling are beginning to make a difference in the amount of waste requiring disposal.

What Are Beverage Container Recycling Laws?[7]

Beverage container recycling laws ("bottle bills") increase recycling by providing a financial incentive for consumers to recycle beverage containers and by providing convenient redemption centers. In California the California Beverage Container Recycling and Litter Reduction Act (Assembly Bill 2020) was passed in 1986 to encourage recycling of aluminum, glass, plastic, and bimetal beverage containers. Under this Act consumers pay California Refund Values (CRV) when they purchase beverages from a retailer, and they are reimbursed when they redeem the

[6]From a review from California Integrated Waste Management Board staff member Brian Foran in December, 1998.

[7]Information was provided by the California Department of Conservation, Division of Recycling.

container at a recycling center. Beverage containers covered by the Act include those filled with carbonated mineral and soda water and other similar carbonated soft drinks, wine coolers and distilled spirit coolers, as well as beer and malt beverages. Californians buy more than 12 million of these beverages each year. Under this program an estimated 80 percent of returnable beverage containers are recycled in the state.

What Are Other Economic Incentives?

Market conditions for recyclable materials are dependent on demand by manufacturers. For example, much of our recovered paper is consumed by overseas paper mills and by U.S. building products manufacturers. When exports or construction activities are strong, prices for recovered paper are generally good. However, if recovered paper exports or construction activity declines, recovered paper prices invariably drop. To improve market conditions for recyclables, we need to remove regulatory and policy barriers to the use of recovered materials and increase the number of products made with those materials.

Recycling is more successful when disposal fees are imposed according to how much trash a resident or business produces. When recycling costs less than disposal, people have an economic incentive to recycle. Residents who pay a flat rate regardless of how many bags of trash they produce have no financial incentive to reduce their waste. There is a need to develop incentives for haulers to implement "pay as you throw" disposal rates to encourage recycling and to discourage wasteful consumption.

What Is Source Separation?

Separating glass, paper, metals, and other recyclables prior to collection is called source separation. Once separated, recyclables are taken to a recycling center or picked up by a recycling collector at curbside.

Source separation requires individual effort, but it is less expensive than separating the materials at a facility after being mixed together. Source-separated materials are generally cleaner and command a higher price than commingled recyclables. Some communities have enacted mandatory source separation, which has proven to be a successful tool for increasing participation in recycling programs.

Although many people who have not tried source separation might think it is difficult, those who regularly practice it find that it is easy and takes up little more space than unsorted waste. Generally, most people are anxious for the opportunity to recycle. When the city of Seattle began its voluntary curbside recycling effort, it expected that it might get 25 percent of the households to sign up for the program; almost 60 percent of eligible households responded in the first month.

What Are Different Components of Recycling Programs?

There are many potential components for a recycling program. Communities must decide which are the best components for them according to certain variables, such as geography, population, markets, regional and state government plans, and current waste composition. Recycling programs can be as simple as conducting a newspaper drive or as complicated as setting up a curbside collection program and building a materials recovery facility. The following recycling program components are common:

Drives are one-shot collections usually organized for one material, such as newspapers or Christmas trees. They are popular as fund-raising events for schools and community organizations but can make only a temporary dent in the waste stream.

Recycling Drop-Offs are a common form of material collection. Bins, sheds, or boxes are set up at accessible public locations for the supervised or unsupervised drop-off of materials. Drop-off locations require a special trip by the recycler unless they are located in a place where most people already need to go, such as a school, grocery store parking lot, landfill, or transfer station.

Buyback Centers are public recycling centers where materials are brought and exchanged for payment. Some centers will pay individuals for small amounts of recyclables; others provide payment only for large amounts.

Reverse Vending Machines are small, automated buy-back centers. They are a recent addition to the recyclable collection system in the U.S. Where beverage containers have deposits, they provide automated collection of aluminum, glass, and plastic soft drink bottles similar to soda vending machines. Containers are inserted, and money is dispensed automatically to the customer.

Curbside Recycling is when each household prepares its recyclables separate from the trash and then places them at the curbside for pickup. Households separate the recyclables according to guidelines provided by the business or government agency providing the recycling service. Haulers typically collect the separated materials in a truck dedicated for that purpose.

What Are Materials Recovery Facilities?

Materials recovery facilities (MRFs) process recyclable materials collected through curbside collection programs before they are delivered to manufacturers for recycling. Processing at MRFs is necessary whether the recyclables are collected separate from each other (source separated) or mixed together (commingled). At MRFs materials are sorted, cleaned (contaminants removed), and usually baled to maximize density for transportation.

MRFs generally combine both mechanical processing (such as conveyor belts and shaker screens) and manual processing (such as hand-picking cardboard from mixed paper). MRFs that process commingled recyclables require more processing steps than MRFs that process only source separated recyclables, and generally end up with more nonrecyclable "residue" because of greater levels of contaminants common with commingled recyclables.

What Are Mixed Waste Processing Facilities?

Once materials enter the waste stream, it is much more difficult and expensive to retrieve them for recycling. What was all jumbled up together must be taken apart. Mixed waste processing facilities are designed to separate recyclables out of the trash. Machines can shred the waste and pass it through tunnels that use air to separate out paper and other light materials. Magnets are used to separate iron and steel from nonferrous metals. Heavy substances such as glass are separated out by weight. Hi-tech separation facilities are very expensive and prone to mechanical failure.

What Are Transfer Stations?

Transfer stations are sites where municipal solid waste is collected (and may be compacted) to be transported elsewhere for landfills or incineration. Individuals and haulers come to the transfer stations, pay "tipping" fees, and deposit their materials in large containers. Many communities have a recycling center at the transfer station, thus encouraging people to recycle some of their materials and reduce their tipping fees at the same time.

For More Information

See specific sections in Appendix C for information on how paper, glass, metals, tires, plastic, and used oil are recycled.

Also see Appendix F, section V, for a list of Web sites related to recycling.

B–IV LANDFILL ISSUES[8]

As of November 1998, Californians were throwing away an average of two pounds per person per day, which was a great improvement over the three pounds per day estimated in 1990. While some cities and counties recycle 50 percent or more of their trash, a significant amount of waste ends up in landfills.[9] Thus, landfills are a necessary part of our overall system for handling waste. Once people have reduced, reused, recycled, and composted as much of the material as possible, there are no other known environmentally sound options for disposing of waste. As of October, 1998, there were 188 active waste landfills operating in California.[10]

One important issue with landfills is that they are filling up. As they fill up, many towns must send their waste farther away from its source, which costs more money and uses more energy. Regulations regarding the placement of new landfills have become stricter, and with growth and development fewer and fewer new suitable landfill sites are available.

Landfills, like most waste management facilities, generate a great deal of truck traffic, noise, and litter. They also attract rodents, gulls, and other pests, and have dust and odor problems. Although studies indicate that the value of properties more than 1000 feet from a landfill are unaffected by its presence, nobody wants a landfill anywhere near his or her home. NIMBY ("Not in My Back Yard") and BANANA ("Build

[8]Adapted from material in *Closing the Loop: Integrated Waste Management Activities for School and Home, K-12*. Sacramento: California Integrated Waste Management Board, 1993, p. D-33.

[9]"California Communities Are Recycling More and Throwing Less Away," Sacramento: California Integrated Waste Management Board, Publication # 530-98-008, November, 1998.

[10]Database "Solid Waste Information System," Sacramento: California Integrated Waste Management Board, December, 1998.

[11]From a review made by the County Sanitation Districts of Los Angeles County in January, 1999.

Absolutely Nothing Anywhere Near Anybody") are acronyms that people use to describe this phenomenon;[11] and because of these feelings, it becomes even more difficult to find new landfill sites.

Landfills can create two significant environmental issues: groundwater contamination from leachate and methane. These issues are discussed below.

What Is Groundwater?

Groundwater is water that has seeped underground through soil and porous stone. When an impervious layer of rock traps this water, it collects in an underground reservoir called an aquifer. The size of any given aquifer varies with the area's geologic conditions. Water can move easily though sand and gravel, but it does not flow through silt easily. The water table is the point at which this water saturates the soil or fractured bedrock.

What Is Leachate and Why Is It a Problem?

Leachate is water that has percolated down through a substance, picking up chemicals or organic matter as it goes. The particles become dissolved in the water and move with it, running off into streams or seeping down to contaminate groundwater. When it rains on a landfill, the passing water can pick up many of the components of the solid waste. Hazardous wastes such as used motor oil, paint products, cleaners, and batteries, all contain elements that add to leachate.

As other wastes decompose, additional hazardous substances may be produced and picked up by leachate. The concentration of hazardous substances in leachate is greatest during the first years after waste is buried; the production of leachate becomes less and less over time.

How Do People Protect Groundwater?

Lining landfills is one way to protect groundwater. At a lined landfill, leachate is collected in pipes located above the liners at the bottom of the landfill. The leachate is pumped through the pipes to a holding tank and then treated on-site or transported to a wastewater treatment plant for final treatment.

There are several other important ways to prevent groundwater contamination. First, people need to reduce the amount of waste that is placed in the landfills by practicing waste prevention and recycling strategies. Second, people need to prevent hazardous substances from entering the landfill. Third, the spread of these hazardous substances to groundwater must be prevented by siting landfills in a correct hydrogeologic area (avoiding, for example, soils that easily transport water); installing a lining and leachate collection devices; and then properly testing, treating, neutralizing and storing the leachate collected. Finally, careful monitoring systems must be put into place to make certain that preventative measures are working and that groundwater is not contaminated.

What Is Methane and When Is It a Problem?

Carbon dioxide, methane, ammonia, and sulfur gases are all produced as microorganisms break down wastes. Trapped beneath the landfill surface, these toxic gases are potential health and safety threats. Methane can cause unexpected explosions and underground fires. Methane can also move laterally beneath the surface of the landfill, exposing adjoining land and homes to explosive gases and polluted air. To prevent these problems, vents or gas control systems are installed in the landfill to reduce the pressure buildup of the gases. For most landfills, gas collection systems are required.

Can We Use Methane as a Fuel?

Methane is the largest component of natural gas, a commonly used fuel. If the volume of the landfill is sufficient, the methane produced is captured, purified by removing carbon dioxide and water, and sold to gas utility suppliers. Alternatively, the methane can be used to fuel on-site combustion-powered electrical generators. Since most landfills are required to have a gas collection system, energy recovery systems that use the methane are quite common.[12]

For More Information

See Appendix F, section III, for a list of Web sites related to landfills.

B–V INCINERATION: WASTE-TO-ENERGY FACILITIES[13]

The first municipal incinerator was designed and built in England more than a century ago.

[12]From a review made by the County Sanitation Districts of Los Angeles County in January, 1999.

[13]The material was adapted from *Closing the Loop: Integrated Waste Management Activities for School and Home, K-12*. Sacramento: California Integrated Waste Management Board, 1993, p. D-28.

It seemed to be a simple, efficient, and a sanitary way to dispose of garbage. Burning garbage eliminated the need for transporting waste from cities, saved space in dumps, and destroyed many disease-causing microorganisms and viruses. The technology was soon imported to this country, and by the 1920s there were more than 300 incinerators in use in the U.S.

When incinerators first came in use, operators and governmental entities did not worry about what was coming out of the smokestacks. As concern rose over air quality, the use of incinerators declined because the cost of meeting air pollution control requirements made it cheaper to put waste in landfills.

What Are Waste-to-Energy Facilities?

A new technology was developed to recover some of the heat from waste incineration, turning water to steam that could then be used to generate electricity. This process lowered the temperature of incinerator exhaust to within the range of temperatures where proven emission control equipment could operate effectively. This technology made possible the installation of pollution control equipment in incinerators, while its ability to generate power helped offset some of the high cost of such equipment. With landfills filling up, this new technology, called "waste-to-energy," "energy recovery," or "resource recovery," led to a renewal of incinerator popularity in the 1970s.

California has three operating waste-to-energy plants.[14] All of them use a mass-burn system to process the refuse and generate electricity for sale to a public entity. The city of Commerce plant, which began in 1987, handles about 320 tons per day of primarily commercial waste. The city of Long Beach's facility, which began burning refuse in 1988, combusts about 1,350 tons per day from the cities of Long Beach, Lakewood, and Signal Hill. The 800-ton-per-day Stanislaus County facility, which started operations in 1989, is the primary disposal method for the county and all of the cities within the county.

The primary purpose of a municipal waste incinerator is to reduce the amount of solid waste that would otherwise go to a landfill. The burning of refuse can reduce the volume by nearly 90 percent. Incinerators can be designed to burn unprocessed solid waste (called "mass burn") or waste that has been shredded, sized, pelletized, or otherwise processed (called "refuse-derived fuel"). The heat from the combustion of waste can be used to produce steam, and the steam can be used for heating or for generating electricity.

When trucks enter a waste-to-energy facility, their loads are weighed and the trucks are routed to the tipping floor or pit. A crane feeds the waste from the pit into the feed hopper for combustion in the furnace. The heat released from the refuse burning heats water in the boiler tubes to create high-pressure steam. The steam is piped to a turbine-generator where it is used to generate electricity for plant usage and sale to the local public utility. The ash from the combustion chamber (called "bottom ash") is collected and mixed with the ash and air pollution control system residue (called "fly ash") to form a combined ash, which is tested, treated, and transported to a landfill and disposed of in a segregated cell.

Incinerators require a steady flow of waste and need to maintain a steady temperature in burning. Noncombustibles in the waste stream, such as glass and metal, inhibit efficient burning, as do kitchen wastes, leaves, and grass because of their high moisture content (30-75 percent) and low energy, or BTU, value. Increasing amounts of petroleum-base plastic, with a high BTU value, in the waste stream also affect burning. In order to maintain a constant furnace temperature, steam and electrical output, and air emission rates, plant operators must regulate the amount and composition of waste fed into the furnace.

How Does Incinerator Pollution Control Equipment Work?

The federal Clean Air Act and California laws and regulations limit the release of air emissions for seven major categories of pollutants: nitrogen oxides, sulfur dioxide, carbon monoxide, particulate matter, total hydrocarbons, acid gases and certain toxic metals. Any proposal for constructing a new incinerator must demonstrate to the local air pollution control district that the plant has been designed to satisfy the emission standards before construction can begin. After construction is completed, the plant must prove that its operations satisfy the requirements.

Pollution control in a state-of-the-art incinerator consists of temperature controls, "dry" or "wet" "scrubbers," and "baghouses." The first and foremost temperature control is efficient combustion of all waste at 1,500 to 1,800 degrees

[14]From a review made by California Integrated Waste Management Board staff member Neal Johnson in December, 1998.

Fahrenheit, eliminating most products of incomplete combustion. Second, exhaust gases are carefully "co-aired" or cooled to precipitate out any dangerous vaporizing metals, such as lead and mercury. "Scrubbers" then use reagents (like lime) to neutralize acid gases. Finally, a "baghouse," essentially a fine mesh filtering system that works something like a vacuum cleaner bag, strains out particulates (including the precipitated metals) from the exhaust gases. Together these controls eliminate most, but not quite all, particulates and acid gases from incinerator emissions. In California the plant's air emissions are continuously monitored by very sophisticated equipment to guarantee that the plant operates in accordance with its permits and does not exceed the emissions standard set by the local air district, the California Air Resources Board, or the U.S. Environmental Protection Agency.

What Happens to Incinerator Ash?

All three of California's waste-to-energy projects combine the ash from the combustion chamber ("bottom ash") and residues from the baghouse and air pollution control system ("fly ash"). The combined ash is tested quarterly by use of standard state and federal test methods.[15] The tests determine the potential for the ash to release or "leach" certain metals from the ash. The ash from the Stanislaus plant is disposed in a special landfill area that has a double plastic liner and a system to collect any water from the ash. The Commerce and Long Beach plants are required to treat the ash with a cement mixture that solidifies the ash so as to minimize the possible release of the metals. The treated ash is then either disposed of or used as a road base at the landfill.

The results of ash testing indicate that the concentrations of metals, such as cadmium, lead, and zinc, occasionally exceed the prescribed "regulatory thresholds." Because of the treatment and disposal practices of the three plants, California regulatory agencies do not feel that the ash presently poses an environmental risk.

What Are the Benefits of Incinerators?

Incinerating solid waste reduces the before-burned volume by up to 90 percent. There are a number of materials, such as appliances, automotive batteries, and motor oil, which cannot or should not be burned. Additionally, there are times when the plant will be shut down for maintenance and repair, and the waste will have to go to a landfill for disposal. Overall, a waste-to-energy plant can reduce the demand for landfill disposal by up to 60 percent. Combustion also destroys potential disease-causing organisms in solid waste and helps keep them out of landfills. Finally, incineration destroys a number of chemical and toxic compounds, such as pesticides and solvents, that can be major sources of contamination at existing landfills.

What About Incinerator Safety?

There is much public debate about the safety of incinerator emissions and ash disposal. Proponents of incineration maintain that the toxicity of emissions and ash are well within levels determined safe by state and federal regulators and most often, in fact, are substantially below levels that should be of concern. They also point out that incineration may actually reduce the amount and leachability of toxic substances that would otherwise be landfilled. Opponents of incineration maintain that the plants emit a number of potentially dangerous air emissions including dioxins, furans, and polychlorinated byphenyls (PCB), and that these emissions are not sufficiently tested for public and environmental safety. They also assert that the incinerator ash contains high concentrations of toxic metals, such as cadmium and lead, which could leach into the groundwater, resulting in contamination.

Fundamental to the incinerator safety debate is whether it is safe to proceed with incinerating waste. Proponents say that based on what scientists know about the potential risks of incineration and landfilling of its ash, there appears to be no significant public health threat. Opponents say that people know too little about the effects of long-term, low-level exposure to some of the by-products of incineration. Until people know more, no chances should be taken with public health. In the last analysis this debate becomes social rather than technical in nature, a question of faith in technology and the limits of human ability to intervene safely in the environment. Political and economic factors ultimately will determine whether incinerators operate in a given community.

[15]From a review made by California Integrated Waste Management Board staff member Neal Johnson in December, 1998.

What Are Some Problems of Incinerators?

Incinerators share many of the problems of any waste management facility (such as landfills and recycling centers), including truck traffic and associated noise and litter. However, since operations take place within an enclosed structure at an incinerator, problems such as litter, odors, and insect and rodent infestation are better controlled than at a landfill.

The construction of a waste-to-energy facility is expensive. These facilities are generally financed by the issuance of long-term bonds, which are repaid with the revenues from operation. Generally, a private operator who contracts with the local government to provide refuse disposal services at a specific price owns the actual plant. The primary revenue sources are the tipping fees and the sale of energy. The price for the sale of electricity is based on the cost of generation by the purchasing utility. While the sale of electricity is a significant revenue source for California's three existing plants, waste-to-energy plants will be successful only to the extent that they avoid the costs of other disposal options and associated environmental problems.

Opponents of incinerators often argue that the plants are oversized and that this creates a "demand" for waste, which tends to reduce the amount of materials to be reduced or recycled. California requires that waste-to-energy plants be designed to accommodate community recycling and waste reduction activities first, before operating as a disposal facility.

Waste-to-energy plants are only as safe as the waste that society produces. Incinerators and their ash are safest if nothing toxic or harmful goes into them. Further, they need to be designed to operate in an integrated fashion with local recycling, composting, and waste reduction efforts.

B–VI HOUSEHOLD HAZARDOUS WASTES[16]

Many products found in our homes are potentially hazardous substances. Because of their chemical nature, these substances can poison, corrode, explode, or ignite easily when handled improperly. When discarded, they are considered household hazardous waste. Since they may threaten human health or the environment when inappropriately disposed of, household hazardous wastes are regulated under California hazardous waste laws. It is illegal to dispose of household hazardous waste in the trash, down storm drains, or onto the ground.

What Are Examples of Potential Household Hazardous Wastes?

Many common household products are considered household hazardous waste when they are discarded. The following are examples of these products:

- Adhesives
- Antifreeze
- Batteries
- Cosmetics
- Drain openers
- Fuel injection and carburetor cleaners
- Fungicides and wood preservatives
- Grease and rust solvents
- Household polishes and cleaners
- Insecticides, herbicides, and rat poisons
- Latex and oil-based paints
- Lighter fluids
- Nail polish and removers
- Oven cleaners
- Paint thinners and strippers
- Used oil and oil filters
- Wood and metal cleaners

Why Are Certain Household Waste Hazardous?

Household hazardous wastes are considered hazardous because they fit into one or more of the following categories:

Toxic: Poisonous or lethal when ingested, touched, or inhaled — even in small quantities.

Ignitable: Flammable.

Corrosive: Eat away materials and living tissue by chemical action.

Reactive: Create an explosion or produce deadly vapors (e.g., bleach mixed with ammonia-based cleaners).

Signal words on the label can serve as a guide to appropriate purchases. With pesticides, DANGER means highly toxic, WARNING means moderately toxic, and CAUTION means slightly

[16]The section was adapted from "Put Household Hazardous Waste in Its Place," Sacramento: California Integrated Waste Management Board, Publication # 331-96-008, April, 1996.

toxic. With household products, POISON means highly toxic, DANGER means extremely flammable or corrosive or highly toxic, WARNING or CAUTION means less toxic.

What Problems Are Associated with Household Hazardous Waste?

Drinking, eating, touching, or breathing household hazardous wastes can seriously harm people and animals, for example:

- Refuse workers and landfill workers can be injured by chemical splashes or poisonous fumes caused by mixed or concentrated household hazardous wastes.
- The environment can be seriously damaged when surface water or groundwater is contaminated with household hazardous waste that has been poured onto or seeped into the ground.
- Bacteria needed to break down sewer and septic tank wastes can be destroyed by untreated household hazardous wastes.

Used batteries, for example, break apart in landfills, causing the heavy metals they contain (primarily mercury, lead, and cadmium) to leach into the ground and surface water. If incinerated, these metals are either released as particulates into the atmosphere, or they are trapped in incinerator ash and placed in a landfill, where they can contaminate water sources.

How Can People Avoid Accidents?

To avoid accidents, consumers should:

- Place household hazardous products or wastes out of reach of children or pets.
- Buy products with fewer harmful ingredients whenever possible.
- Read and follow the label's directions when using the product.
- Never mix the product with other products.
- Buy only what is needed and use the entire product.
- Never dispose of hazardous materials in the trash, on the ground, or in storm or sewer drains.
- Keep products in their original containers with the product labels.
- Recycle the product according to the directions provided on the label and those from available collection programs.

What Is the Proper Way to Deal with Household Hazardous Waste?

Reduce by purchasing only the amount you need of the least toxic product that will do the job.

Reuse the products by donating unused portions to friends or community organizations.

Recycle leftover household hazardous products that are recyclable and dispose of the others safely by participating in your local household hazardous waste collection program.

For More Information

Contact your city's or county's environmental health, solid waste, or public works department for information regarding which wastes are recycled in your area.

Contact the local environmental health agency or the California Environmental Protection Agency's Environmental Hotline at 1-800-CLEAN-UP to acquire automated information on household hazardous waste collection programs in your community.